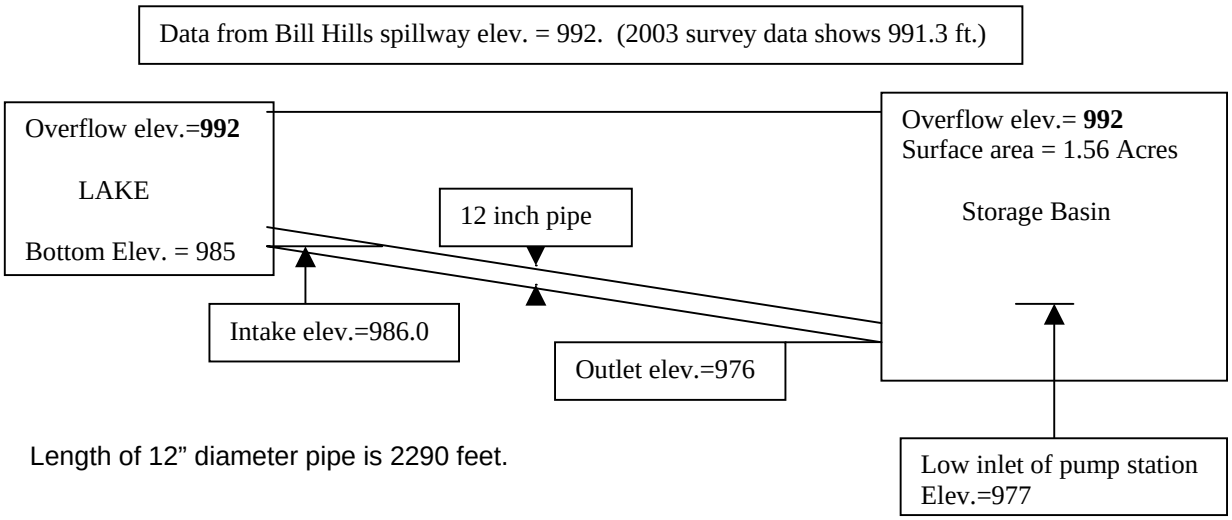
Eagleville, Missouri
Harrison County PWSD #1
Water Supply Study

Eagleville Lake supplies water for Harrison County PWSD #1. This lake was built as part of the East Fork Big Creek PL-566 watershed project. It does not have planned water supply as part of the design of the lake. Water is drawn from the sediment pool. At the time of construction the city elected not to include municipal water supply but requested use of the water in the sediment pool. As a result the lake is very shallow. Because the lake is shallow, evaporation can be a problem. A holding basin for additional storage has been constructed just downstream of the lake. There is a 12-inch diameter pipe connecting the lake and the basin. The overflow elevation for the basin is the same elevation as the spillway of the lake. As a result the pipe connecting the two water bodies serves as an equalization medium so that the water level is the same for each reservoir. The following shows the elevations and configuration of the water supply system.



Length of 12" diameter pipe is 2290 feet.

The existing demand in year 2000 was 86,000 gallon per day.
Optimized demand from the lake without the downstream storage basin is 43,615 gallon per day and the optimized demand from the lake in combination with the downstream storage basin is 87,000 gallon per day.

Lake analysis consisted of using the NRCS's computer program called "RESOP". Following is the data and procedures for input to the program.

STO-AREA Elevation-Storage and Elevation-Area data for the lake were determined from July 11, 2003 survey made by USGS. The storage in the basin was estimated based on a surface area of 1.56 acres and a depth of 16 feet. The values for the basin were determined by

adding the lake and basin together. Following is the results of the lake survey.

Harrison County PWSD #1
Eagleville Lake

Elevation (feet)	Area (acres)	Storage (ac-ft)
985.0	3.4	1.0
986.0	7.9	6.8

987.0	11.4	16.4
988.0	15.3	29.8
989.0	20.7	47.4 Water Surface on 5/28/2003
990.0	25.7	70.7
991.0	27.7	97.6
991.3	28.2	111.6 Spillway Elevation

To treat the lake and basin as one reservoir the following table was used.

Lake plus Basin		
Elevation (feet)	Area (acres)	Storage (ac-ft)
973	0.0	0.0
974	1.56	0.8
976	1.56	3.9
978	1.56	7.1
980	1.56	10.2
982	1.56	13.3
984	1.56	16.5
985	5.0	19.1
986	9.5	26.4
987	13.0	37.6
988	16.9	52.6
989	22.3	71.7
990	27.3	96.6
991	29.3	125.1
991.3	29.8	139.5

Spillway Elev. = 991.3 Feet msl.
Minimum Elev. = 987.3 Feet msl.

The holding basin has a surface area of 1.56 acres and is approximately 16 feet deep. There is no drainage area to the holding pond.

LIMITS Maximum Pool storage 139.5 Ac.Ft.
Minimum Pool storage 5.5 Ac.Ft.

Starting storage was considered at maximum pool.

The Drainage area of the lake is 3009 acres (4.70 Sq.Mi.).
The holding pond has no drainage area of its own.

GENERAL The adjustment to convert from pan evaporation to lake evaporation was made for the control word EVAP. The factor was 0.76. As a result, a factor of 100 was used here.

The record period of drought is in the 1950's, analysis began in January 1951 and ended December 1959.

SEEPAGE The reservoir seepage varied from 0 seepage near empty to a maximum of 1.0 inch per month when at full pool. The material in the dam is compacted earth of clayey soils. The lake is shallow so that static pressure is low. As a result seepage is small.

RAINFALL Rainfall data came from the Bethany, Mo. rain gage.

RUNOFF This is the runoff into the lake from its drainage area. Monthly runoff volumes in watershed inches. To determine runoff, East Fork Big Creek stream gage at Bethany having was

used. The drainage area at the gage is 95 square miles. Eagleville is in the East Fork Big Creek watershed. Monthly runoff was compared to the rainfall and if the results did not appear reasonable, adjustments were made for that month by looking at individual rains and estimating antecedent moisture then adjusting runoff based on NRCS's runoff curve numbers.

EVAP. Pan evaporation at the Lakeside gaging station was used as a base because it has data for year around evaporation. This data was updated with gage data from stations at Spickard, New Franklin, and Columbia. Depending on the latest data for the station nearest to Eagleville. The adjustment factor of 0.76 to convert from pan to lake evaporation was applied at this step.

DEMAND Harrison County PWSD #1 used 0.086 MGD in year 2000. The lake, by itself, would supply only supply 44,000 gallon per day during the 1950's when the drought of record occurred.

The lake plus the basin meets the demand of 0.086 MGD with no extra volume of storage in reserve.

OTHER Other is other gains or losses from other sources but is not applicable for this water supply.

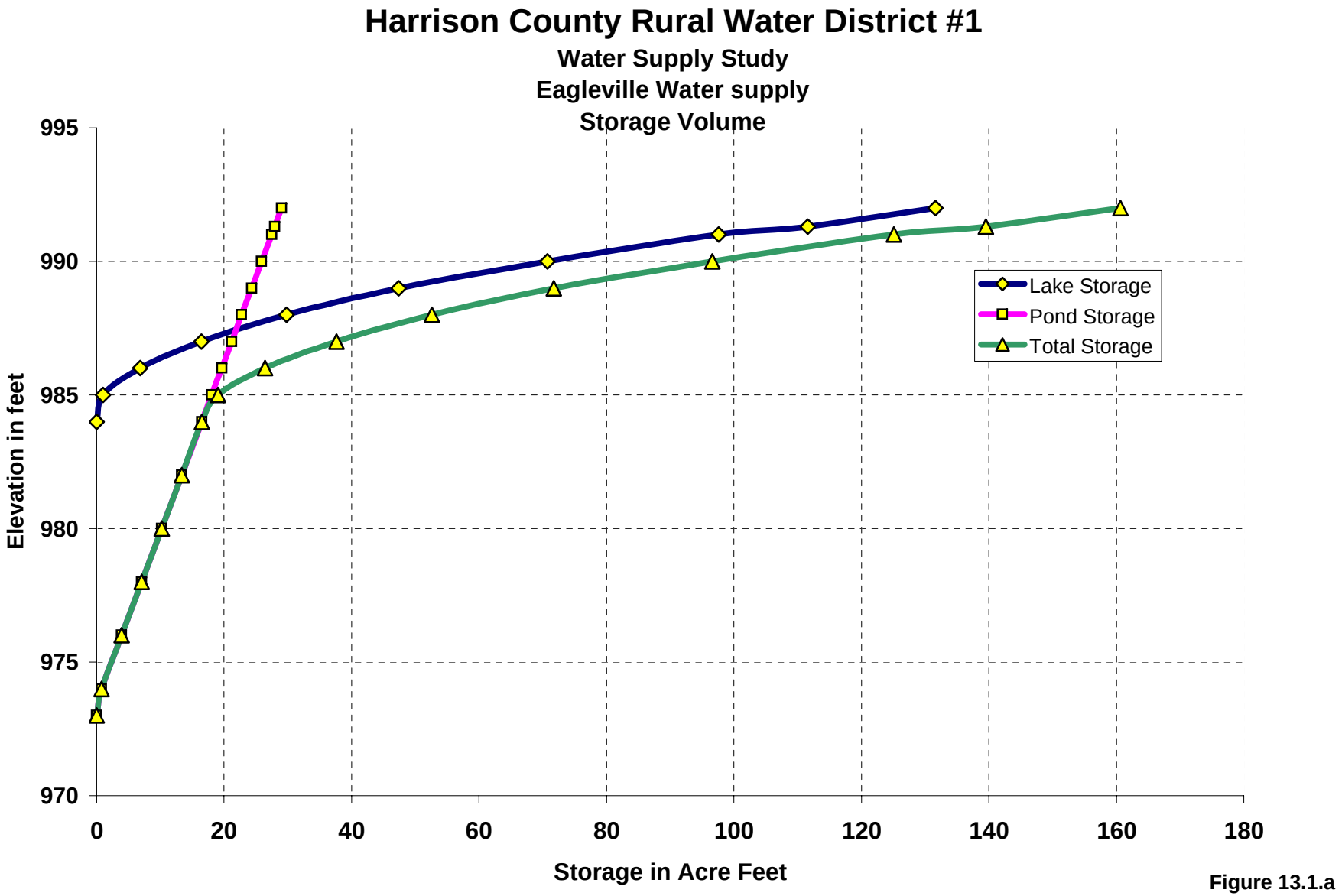

Harrison County Rural Water District #1
Water Supply Study
Eagleville Water supply
Storage Volume
Elevation in feet
995
990
985
980
975
970
0
20
40
60
80
100
120
140
160
180
Storage in Acre Feet
Lake Storage
Pond Storage
Total Storage

Figure 13.1.a

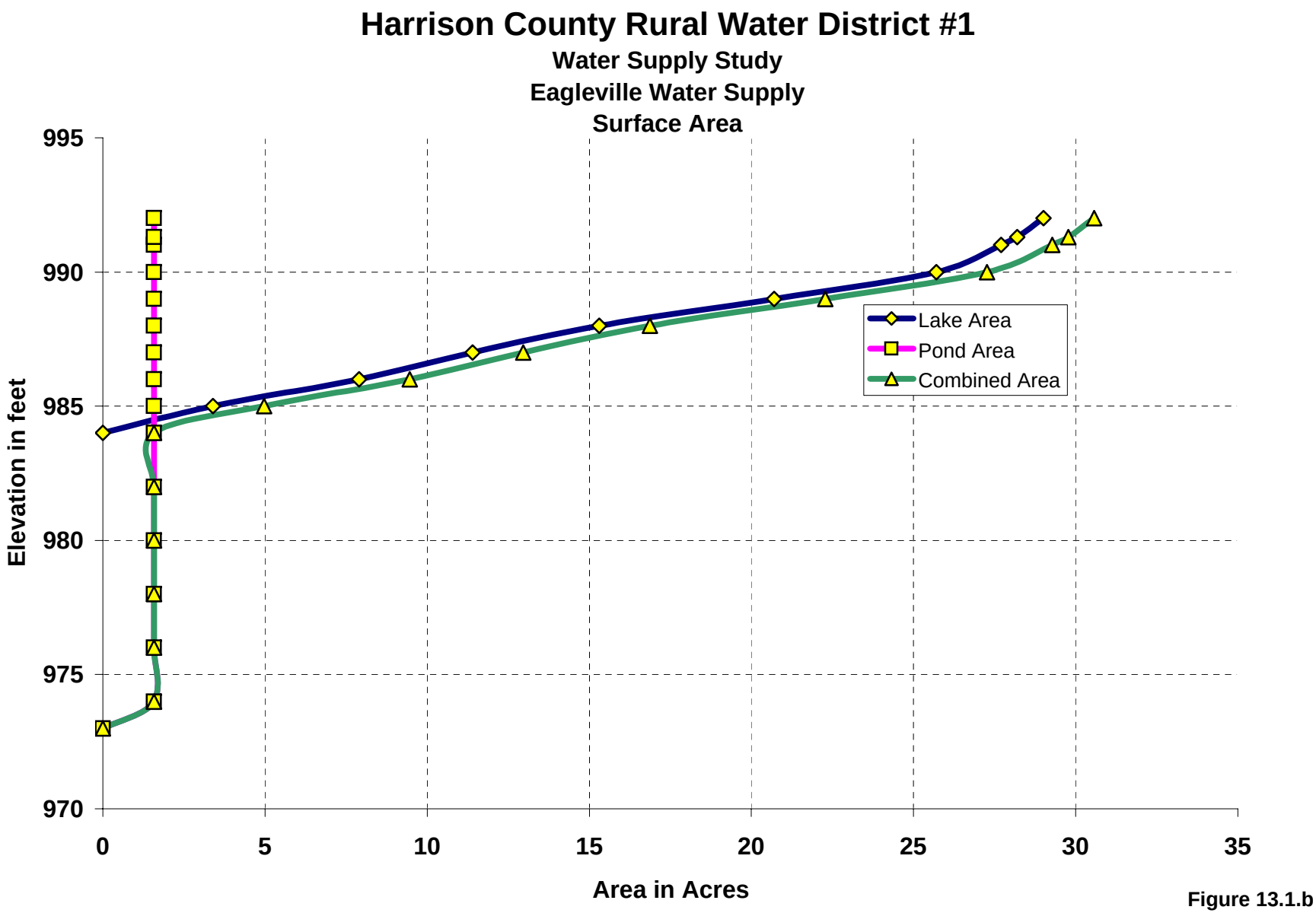

Harrison County Rural Water District #1
Water Supply Study
Eagleville Water Supply
Surface Area
Elevation in feet
995
990
985
980
975
970
0
5
10
15
20
25
30
35
Area in Acres
Lake Area
Pond Area
Combined Area

Figure 13.1.b

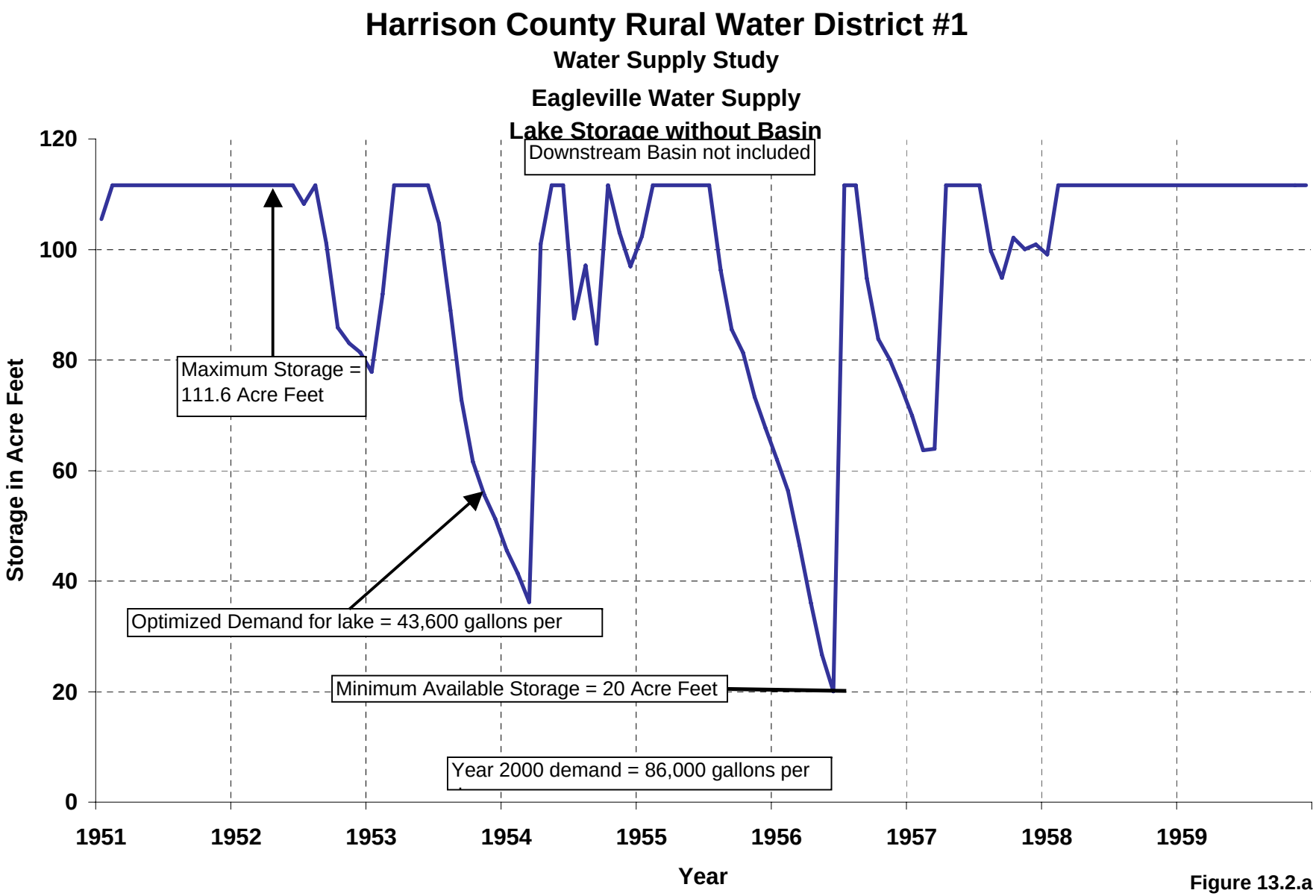

Harrison County Rural Water District #1
Water Supply Study
Eagleville Water Supply
Lake Storage without Basin
Downstream Basin not included
Maximum Storage = 111.6 Acre Feet
Optimized Demand for lake = 43,600 gallons per
Minimum Available Storage = 20 Acre Feet
Year 2000 demand = 86,000 gallons per
Storage in Acre Feet
120
100
80
60
40
20
0
1951
1952
1953
1954
1955
1956
1957
1958
1959
Year

Figure 13.2.a

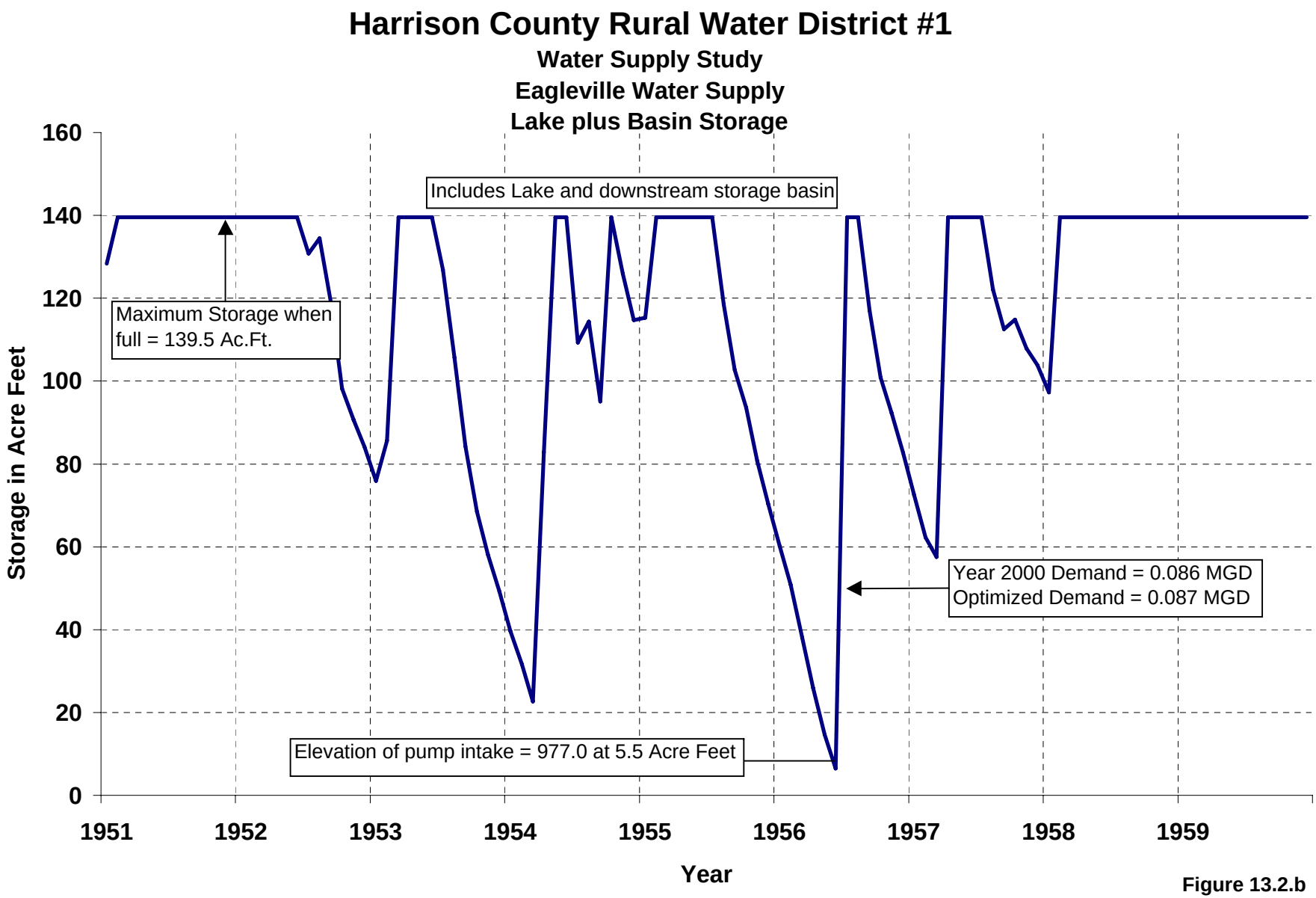

Harrison County Rural Water District #1
Water Supply Study
Eagleville Water Supply
Lake plus Basin Storage
Storage in Acre Feet
160
140
120
100
80
60
40
20
0
1951
1952
1953
1954
1955
1956
1957
1958
1959
Year
Includes Lake and downstream storage basin
Maximum Storage when full = 139.5 Ac.Ft.
Year 2000 Demand = 0.086 MGD
Optimized Demand = 0.087 MGD
Elevation of pump intake = 977.0 at 5.5 Acre Feet

Figure 13.2.b

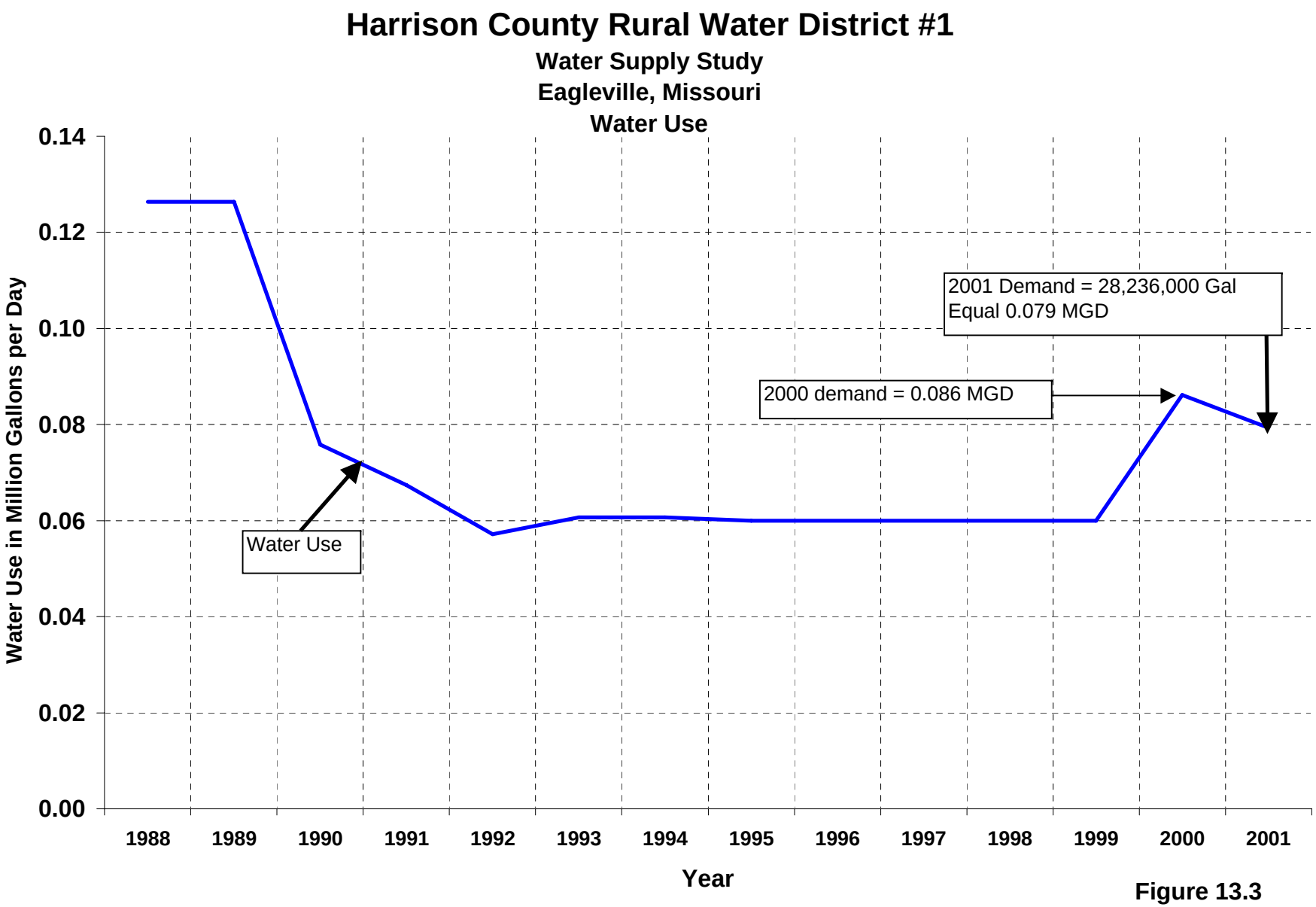

Harrison County Rural Water District #1
Water Supply Study
Eagleville, Missouri
Water Use
Water Use in Million Gallons per Day
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Year
2001 Demand = 28,236,000 Gal
Equal 0.079 MGD
2000 demand = 0.086 MGD
Water Use

Figure 13.3

EAGLEVILLE LAKE

Elevation (feet)	Area (acres)	Volume (acre-ft)
985.0	3.4	1.0
986.0	7.9	6.8
987.0	11.4	16.4
988.0	15.3	29.8
989.0	20.7	47.4
990.0	25.7	70.7
991.0	27.7	97.6

Table 23. Lake elevations and respective surface areas and volumes. Top of spillway structure is 991.3 feet. Elevations referenced to North American Vertical Datum 1988 (NAVD 88).

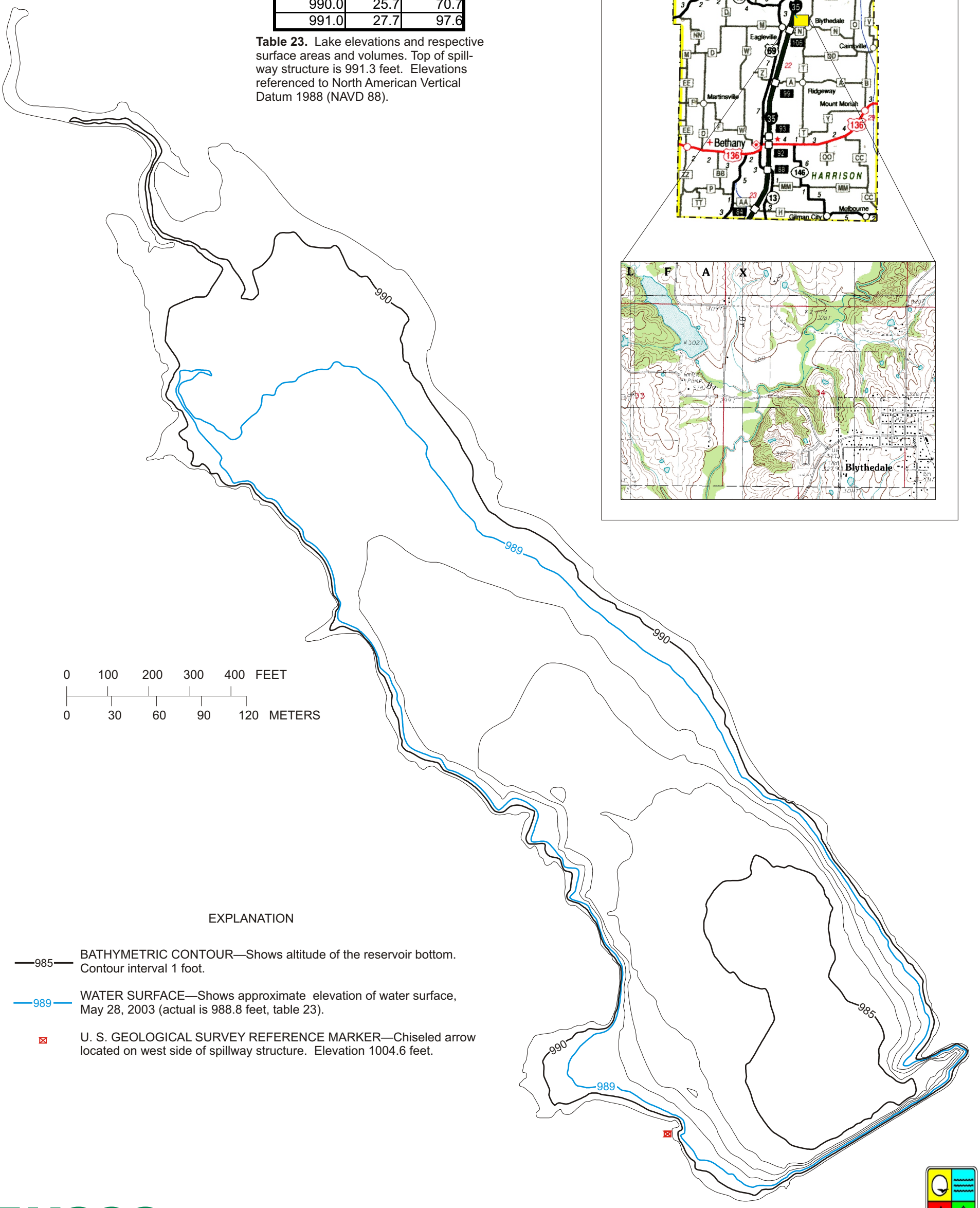


Figure 23. Bathymetric map and table of areas/volumes of Eagleville Lake near Blythedale, Missouri.

In cooperation with Missouri Department of Natural Resources